

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

August 1936

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine

A METHOD OF REARING COCHLIOMYIA AMERICANA C. AND P. ON ARTIFICIAL MEDIA

By Roy Melvin and R. C. Bushland, Division of Insects Affecting Man
and Animals

Since the description of Cochliomyia americana by Cushing and Patton in 1933, many studies have been started on this, the primary myiasis-producing species of America. Progress in several of these studies has been hampered by the inconvenience and cost of maintaining ample breeding stock, especially during the winter months. It was apparent that the development of an artificial medium on which larvae of C. americana could be reared would minimize the difficulties encountered in the present methods, which involve the infesting of live animals. It was with this in mind that the study the results of which are presented herein was undertaken.

Tests conducted in 1934, designed to determine whether Cochliomyia americana would breed in carcasses or animal products, showed that partly developed larvae would complete their development in guinea-pig carcasses, especially if kept at high temperatures, and that newly hatched larvae placed on either raw lean beef or hard-boiled eggs (hen's) kept at 99° F. would attain sufficient size to pupate and produce a few small, although otherwise apparently normal, flies. Starting with this information, we have conducted more than 2,000 experiments with diets composed of various combinations of eggs, beef, blood, milk, vitamin-rich substances, salts, acids, bases, preservatives, agar, etc. These tests were made in various types of containers ranging from 10-cc vials to no. 2 galvanized tubs, and at different temperatures, both constant and varying.

On several of the diets growth occurred for 2 to 4 days at some temperatures and then ceased. Larvae wandered over the surface of a then soft and foul-smelling medium, most of them finally dying. Although this condition was completely eliminated when the larvae were reared aseptically, the technique involved in the aseptic method almost prohibits its use for rearing large numbers of larvae for stock or experimental purposes. The addition of formaldehyde prevented the putrefaction of media to a marked degree, as indicated by the odor, and on most media to which it was added the number, size, and vigor of the larvae produced was increased.

The weight and number of the pupae reared in a given unit were used as criteria of the efficiency of a medium. All larvae from each experiment were placed in pint jars half filled with sand one-fourth saturated with water. Soon after pupation the pupae were washed, dried on blotter paper, and weighed. The best results are obtained on a medium composed of 750 cc milk, 250 cc citrated calf blood, 0.5 cc formaldehyde, and 500 g ground lean beef, thoroughly mixed in a 6-quart enameled pan. From 2,000 to 3,000 newly hatched larvae are placed on cotton (about 10 g) which has been rolled in the mixture to form a raft. One of the salient merits of this medium is the lack of objectionable odors, even after the larvae have matured and migrated. The pupae obtained from this medium weighed from 40 to 60 mg, depending on the population density. As to the practicability of this medium, in one test more than 100,000 pupae that averaged 45 mg were obtained from 15 tubs of the medium, which cost less than \$30.

Referring to the pupal weights given above, mention should be made of the fact that pupae from our stock cultures reared on guinea pigs and rabbits weighed about 45 mg. A few larvae that were reared on calves produced pupae that weighed 75 mg. After comparing the flies reared from these pupae with flies in our collection and from other sources, we feel that this figure approximates the maximum size of the species and that the average weight of pupae in nature is between 45 and 55 mg.

The fecundity of flies reared on artificial media is being investigated. We have found that these flies lay fertile eggs and that resulting larvae develop on artificial media, at least for six consecutive generations. Mention should be made here that flies from larvae reared aseptically also produced fertile eggs.

Extensive tests were made at constant temperatures of 94° and 99° F. However, we have found that neither constant nor high temperatures are essential to the development of Cochliomyia americana larvae on this and certain other media.

From these studies we conclude that the larvae of Cochliomyia americana, a supposedly obligatory parasite, can be reared easily on a mixture of milk, blood, beef, and formaldehyde.